AT
Filed

Please type a plus sign (+) inside this box → [+]

HDP/SB/21 based on PTO/SB/21 (08-00)

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	**09/632,215**
Filing Date	August 3, 2000
Inventor(s)	Krishna BALACHANDRAN et al.
Group Art Unit	2661
Examiner Name	Robert W. Wilson
Attorney Docket Number	29250-000952/US

ENCLOSURES *(check all that apply)*

- ☒ Fee Transmittal Form
  - ☒ Fee Attached
- ☐ Amendment
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
- ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Assignment Papers *(for an Application)*
- ☐ Letter to the Official Draftsperson and One Sheet of Formal Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) ____
- ☐ After Allowance Communication to Group
- ☐ LETTER SUBMITTING APPEAL BRIEF AND APPEAL BRIEF (w/clean version of pending claims)
- ☒ Appeal Communication to Group (*Brief, in triplicate*)
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) *(please identify below)*:

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm *or* Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name John E. Curtin	Reg. No. 37,602
Signature			
Date	October 25, 2004		

PTO/SB/17 (10-01)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

FEE TRANSMITTAL for FY 2004

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT ($) **340.00**

Complete if Known	
Application Number	09/632,215
Filing Date	August 3, 2000
Inventor(s)	Krishna BALACHANDRAN et al.
Examiner Name	Robert W. Wilson
Group Art Unit	2661
Attorney Docket No.	29250-000952/US

METHOD OF PAYMENT (check one)

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account Number: 08-0750

Deposit Account Name: Harness, Dickey & Pierce, P.L.C.

☒ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17

☐ Applicant claims small entity status. See 37 CFR 1.27

2. ☒ Payment Enclosed:

☒ Check ☐ Credit card ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	790	2001	395	Utility filing fee	
1002	350	2002	175	Design filing fee	
1003	550	2003	275	Plant filing fee	
1004	790	2004	395	Reissue filing fee	
1005	160	2005	80	Provisional filling fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES

			Extra Claims		Fee from below	=	Fee Paid
Total Claims		-20 **		=		X	
Independent Claims		-3 **		=		X	
Multiple Dependent						X	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	88	2201	44	Independent claims in excess of 3
1203	300	2203	150	Multiple dependent claim, if not paid
1204	88	2204	44	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	1053	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	430	2252	215	Extension for reply within second month	
1253	980	2253	490	Extension for reply within third month	
1254	1,530	2254	765	Extension for reply within fourth month	
1255	2,080	2255	1,040	Extension for reply within fifth month	
1401	340	2401	170	Notice of Appeal	
1402	340	2402	170	Filing a brief in support of an appeal	340
1403	300	2403	150	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive – unavoidable	
1453	1,370	2453	685	Petition to revive – unintentional	
1501	1,370	2501	685	Utility issue fee (or reissue)	
1502	490	2502	245	Design issue fee	
1503	660	2503	330	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	790	2809	395	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	790	2810	395	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	790	2801	395	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($)340

SUBMITTED BY

Complete *(if applicable)*

Name (Print/Type)	John E. Curtin	*Registration No. Attorney/Agent)*	37,602	*Telephone*	703-668-8000
Signature				*Date*	October 25, 2004

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No. _____

Appellants:	Krishna BALACHANDRAN et al.
Application No.:	09/632,215
Group No.:	2661
Filed:	August 3, 2000
Examiner:	Robert W. Wilson
For:	METHODS AND DEVICES FOR SCHEDULING TRANSMISSIONS IN INTERFERENCE-LIMITED NETWORKS

Attorney Docket No.: 29250-000952/US

BRIEF ON APPEAL ON BEHALF OF APPELLANT

U.S. Patent and Trademark Office
220 20th Street S.
Customer Window Mail Stop Appeal Brief - Patents
Crystal Plaza Two, Lobby, Room 1B03
Arlington, VA 22202

October 25, 2004

TABLE OF CONTENTS

BRIEF ON BEHALF OF APPELLANT

In support of the Notice of Appeal filed August 26, 2004, appealing the Examiner's final rejection mailed April 26, 2004 of each of pending claims 1-32[1] of the present application, Appellant hereby provides the following remarks.

I. REAL PARTY IN INTEREST

The present application is assigned to Lucent Technologies Inc., by an Assignment recorded on August 3, 2000, Reel 010995, Frame 0357.

II. RELATED APPEALS AND INTERFERENCES

The Appellant does not know of any appeals or interferences which would directly affect or which would be directly affected by, or have a bearing on, the Board's decision in this Appeal.

III. STATUS OF THE CLAIMS

The claims reproduced in the attached Appendix A are the claims on Appeal. Each of these claims is currently pending in the application.

IV. STATUS OF ANY AMENDMENTS FILED SUBSEQUENT TO THE FINAL REJECTION

An Amendment dated July 26, 2004 (see Appendix B) was filed with the U.S. Patent Office in response to the Final Rejection dated April 26, 2004. For purposes of appeal, Appellants will presume that this Amendment will be considered and entered.

[1] Subject to entry of an Amendment after Final (see Appendix B).

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The invention relates to techniques for prioritizing and authorizing uplink and downlink transmissions in an interference-limited system using a channel quality or data rate to minimize the effects of interference.

Interference-limited systems have proliferated in recent years. These systems give users the convenience of real-time communications without the physical constraints of dedicated lines. In these systems, the data rate that can be achieved is dependent upon the amount of interference with a "transmission" (e.g., a cellular telephone call). The amount of interference is reflected in the quality of the channel ("channel quality"). The channel quality for a given transmission depends upon several factors, including path loss between a base station (e.g., a cell) and a terminal unit (e.g., a cellular phone), and interference from other transmissions within the same network.

Channel quality metrics such as the carrier-to-interference ratio (the "C/I ratio"), the bit error probability, and the coefficient of variation of the bit error probability, are often used as indicators of the data rate that can be achieved in a given transmission. Higher data rates can be achieved when the channel quality improves, e.g., at higher C/I values (see Specification, page 1).

While interference is a limiting factor, the bandwidth available to these systems is also limited. When there is more than one user competing for part of the available bandwidth, methods and devices must be devised which allocate bandwidth efficiently and appropriately. Typically, users will be competing for bandwidth when they seek to send or receive transmissions at substantially the same time. For example, before uplinking, competing users

will typically request authorization to transmit. Similarly, before downlinking, a base station controls transmissions to be sent to competing users. Any method must prioritize both uplink and downlink transmissions. Taking various factors into consideration, uplinked and downlinked transmissions can be authorized in accordance with a prioritization schedule or the like.

Prior to proceeding, it should be understood that the word "scheduling" may mean prioritizing, authorizing, or some combination of the two.

Scheduling methods have been the subject of significant study. A number of methods have been proposed, including "first-in-first-out," "weighted fair queuing," "round-robin scheduling," and "virtual clock." Under existing methods, users transmitting over channels whose channel quality is low are not penalized, but are protected and given a fair share of the bandwidth. These "fairness methods" are designed to allocate additional transmission time to users transmitting via such channels in order to allow the transmission of approximately the same amount of data as users making use of channels whose quality is much higher.

In developing these fairness methods, however, it has been assumed that the link level characteristics of each user's channel are independent of the scheduling method used. This assumption, though, neglects to account for the fact that the scheduling method has a considerable impact on the channel quality (i.e., achievable data rate) achieved by each user. That is, when a user is transmitting, the transmission itself causes interference to other transmissions. As a result, the longer such a user is transmitting, the more interference other users experience. Because the amount of interference is dependent upon the scheduling method, other users' achievable data rates will be reduced, which in turn increases the amount of time

they spend transmitting, ultimately causing even more interference to other users (Specification, pages 2 and 3).

Accordingly, the present invention provides methods and devices for authorizing and prioritizing transmissions in interference-limited networks that take into account the interdependence between scheduling and interference.

Such methods and devices include a device adapted to prioritize uplinked transmission request signals from terminal units based on achievable data rates. The device is further adapted to assign a highest priority to a transmission request signal associated with a highest achievable data rate. Such devices may comprise a bandwidth allocation unit or one of a number of different multiplexers.

Further, the device is adapted to authorize a terminal unit associated with the highest achievable data rate to send an uplinked transmission.

Similarly, the present invention envisions the same or a different device which is adapted to prioritize transmission test signals downlinked to terminal units based on achievable data rates. Thereafter, the device is adapted to assign a highest priority to a transmission test signal associated with a highest achievable data rate, and authorize a downlinked transmission to a terminal unit associated with the highest achievable data rate (Specification, page 3).

FIG. 1 (see Appendix C) shows an interference-limited communication network 100 comprising a control device or means 10, and a plurality of terminal units 1, 2, ..., n. Of course, FIG. 1 does not show all of the component parts of a communication network. It should be understood that the control device 10, and the plurality of terminal units 1, 2, ..., n are only some of the parts making up such a network.

In an illustrative embodiment of the present invention, the device 10 is adapted to schedule transmissions in an interference-limited network, giving priority to a transmission request signal S_{Rj} (where $1 \leq j \leq n$) associated with the highest achievable data rate. The device 10 is further adapted to give priority to a transmission test signal S_{Tk} (where $1 \leq k \leq n$) also associated with a highest achievable data rate. It should be noted that j, k are not necessarily the same because uplink and downlink behavior can be different.

As shown in FIG. 1, the device 10 comprises a prioritization unit or means 20, and an authorization unit or means 30. Though shown as separate units, these units may be combined into a single unit. Likewise, they may be further broken down into additional units that perform substantially the same functions and operate in substantially the same manner as the separate units. Though referred to as a control device, it should be understood that this is arbitrary. The device 10 may be called by various names without departing from the spirit and scope of the present invention so long as it functions to authorize transmissions in an interference-limited network. It should be understood that by authorizing transmissions according to a channel's data rate, the device 10 inherently allocates bandwidth as well. In alternative embodiments of the invention, the device 10 may comprise a bandwidth allocation unit, a frequency division multiplexer, a time division multiplexer, or a code division multiplexer to name just a few examples (see Specification, pages 4 and 5).

In addition, it should also be noted that the present invention is not limited to cellular networks or to any particular frequency band, but rather is applicable to any shared-media network or frequency in which one transmission may cause interference to another transmission.

In alternative embodiments of the invention, the network may transmit in the radio, microwave, wireless LAN, or infrared frequencies.

Regardless of the frequency employed in the communication network 100, metrics regarding the channel quality (i.e., achievable data rate), including the C/I ratio, the bit error probability, and the coefficient of variation of the bit error probability, are routinely measured by methods known in the art, and reported to the control device 10. In the discussion which follows, and for purposes of the present invention, the terms achievable data rate and channel quality will be used interchangeably and have the same meaning; more of a given signal is allowed to pass through a given channel.

One example of how the device 10 operates to prioritize and authorize uplink transmissions is as follows.

In an illustrative embodiment of the invention, a terminal unit 1 sends a transmission request signal S_{R1} to the control device 10. Additionally, and at substantially the same time, a second terminal unit 2 sends a request signal S_{R2} to the control device 10. Furthermore, any number of terminal units, up to terminal unit n, may send a request signal S_{Rn} to the control device 10 at substantially the same time (see Specification, pages 5 and 6).

Using means known in the art, the device 10 is adapted to receive the request signals S_{R1}, S_{R2}, ... S_{Rn}. A terminal unit 1, 2 .... n sends a request signal when it needs to send a transmission. In an illustrative embodiment of the invention, the prioritization unit 20 is adapted to prioritize the request signals S_{R1}, S_{R2}, ... S_{Rn} based on the achievable data rate associated with each request signal. More specifically, the prioritization unit 20 is adapted to assign a priority to each request signal based on the data rates associated with each request signal, for example,

assigning the highest priority to the request signal S_{Rn} associated with the highest achievable data rate.

Thereafter, authorization unit 30 is adapted to send an authorization signal S_{An} to a terminal unit n according to the assigned priorities. In an illustrative embodiment of the invention, the authorization unit 30 is adapted to send the authorization signal S_{An} to the terminal unit n associated with the highest assigned priority (i.e., the highest achievable data rate). Upon receiving an authorization signal S_{An}, the terminal unit n is then authorized to send a terminal transmission to a receiver (not shown) within the network 100. In an illustrative embodiment of the invention, the control device 10 is separate from such a receiver. In an alternative embodiment, a control device 10 envisioned by the present invention comprises a receiver.

Substantially after this is completed, the authorization unit 30 is adapted to generate authorization signals S_{A1}, S_{A2}, ... S_{An} to authorize the remaining terminal units 1, 2 ... n to send transmissions to receivers within the network 100 according to their priority.

Though the examples above and below use the highest achievable data rate as the highest priority, the invention is not so limited. Any data rate (and, therefore, terminal unit) may be assigned the highest (i.e., first) priority (see Specification, pages 6 and 7).

In an illustrative embodiment of the invention, one example of how the device 10 operates to prioritize and authorize downlink transmissions is as follows. Before beginning, it should be understood that the device 10 may authorize downlink transmissions to different terminal units 1, 2 .... n than were authorized to uplink transmissions.

Referring again to FIG. 1, the device 10 is adapted to authorize transmissions in an interference-limited network 100. Using means known in the art, the device 10 is adapted to

send transmission test signals S_{T1}, S_{T2}, ... S_{Tn} to the terminal units 1, 2, and n. In an illustrative embodiment, the prioritization unit 20 is adapted to prioritize the transmission test signals S_{T1}, S_{T2}, ... S_{Tn} based upon achievable data rates associated with each signal. More specifically, the prioritization unit 20 is adapted to assign a priority to each transmission test signal, for example, assigning the highest priority to the transmission test signal S_{Tn} associated with the highest achievable data rate.

Thereafter, in an illustrative embodiment of the invention, the authorization unit 30 is further adapted to authorize transmissions to a terminal unit n associated with the highest assigned priority (e.g., the highest achievable data rate).

Similar to before, once a transmission to the terminal unit associated with the highest priority is completed, the authorization unit 30 is adapted to authorize transmissions to the remaining terminal units 1, 2 ... n based on their assigned priority.

In an alternative embodiment of the present invention, the prioritization unit 20 is further adapted to periodically poll the signal channel quality associated with one or all of the active terminal units 1, 2, ..., n in order to update channel quality metrics. This allows the signal channel quality of the channel associated with each terminal unit n to be dynamically monitored. Thereafter, the unit 20 can be adapted to adjust priorities of one or all of the terminal units 1, 2 ... n accordingly,

Taken together, the sequence in which transmissions are prioritized and authorized make up a schedule. By so scheduling transmissions, interference with a given transmission is reduced.

It should be understood that the signals S_{A1}, S_{A2} ... S_N, S_{R1}, S_{R2} ... S_{Rn} and/or S_{T1}, S_{T2} ... S_{Tn} may be combined into a single signal or further broken into further signals using means known in the art. This is because the exact number of signals used is not important; only the channel quality between the device 10 and terminal units 1, 2 .... n is important to realizing the present invention.

Though the description above has focused on devices, the present invention also envisions methods for scheduling transmissions in interference-limited networks that take into account the interdependence between scheduling and interference.

VI. ISSUES TO BE REVIEWED ON APPEAL

i. Whether or not claims 1-18 are patentable under 35 U.S.C. §112, first paragraph?

ii. Whether or not claims 1-6, 9, 19-22 and 27[2] are patentable under 35 U.S.C. §103(a) as being obvious over Sumner, U.S. Patent No. 6,091,947 ("Sumner").

VII. ARGUMENTS

a. The Section 112 Rejections

In the Final Rejection, claims 1-18 were rejected under 35 U.S.C. §112, first paragraph, the Final Rejection stating that:

> ....they are single means claims in which the breadth of the claim cannot be ascertained. ... referring to claims 1 and 13, [these claims] recite a device in the preamble followed by language describing the function of the device. The Applicant has applied the word "means" by defining a claim with a device followed by its function. *In re Hyatt* held that a single means held not enabling scope of the claim because the specification disclosed only those means known to the inventor; whereas, the claim covers every

[2] Claims 23-26 and 28-32, which depend from one or more of the above-mentioned claims, were objected to, the Final Office Action stating they would be allowable if rewritten in independent form to include features of any intervening claims and the base claim.

> conceivable structure (means) for achieving this state property while the specification discloses at most only those known to the inventor. ... in addition, claims 2-12 and 4-18 are rejected because they do not recite an additional means. (words in brackets added)

Though Appellants disagree with the characterization of claims 1-18 given above, nonetheless, Appellants have amended these claims (see Appendix B) to include the terms "prioritization unit" and/or "authorization unit."

Accordingly, Appellants respectfully submit that these claims are now in condition for allowance and respectfully request that the Board so indicate that these claims are allowable in its decision.

b. <u>The Section 103 Rejections</u>

Claims 1-6, 9, 19-22 and 27 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sumner.

Each of these claims requires the authorization of transmissions to terminal units based on the priority given to test signals sent to each of the terminal units ("test signals").

In contrast, Sumner does not disclose or suggest the authorization of transmissions to terminal units based on the priority given to test signals, as in claims 1-6, 9, 19-22 and 27.

Column 7 of Sumner appears to disclose the reception of a test signal by a handset and the calculation of outbound and inbound link performances. However, Sumner does not disclose or suggest the authorization of transmissions to particular handsets based on prioritizing test signals. Instead, transmission handsets are unprioritized (i.e., occur in any order). That is, as long as the calculated link performances allow for transmission, transmission occurs regardless of priority. If the link performance is unsatisfactory, non-transmission occurs and the call is routed to a user's voicemail.

of priority. If the link performance is unsatisfactory, non-transmission occurs and the call is routed to a user's voicemail.

Accordingly, Appellants respectfully submit that claims 1-6, 9, 19-22 and 27 (and the objected to claims) would not have been obvious to one of ordinary skill in the art at the time the present application was filed. Appellants respectfully request that the Board reverse the decision of the Examiner and allow claims 1-6, 9, 19-22 and 27 (and the objected to claims as well).

IX. CONCLUSION

Accordingly, for at least the aforementioned reasons, Appellants respectfully request the Honorable Members of the Board of Patent Appeals and Interferences to reverse each of the outstanding rejections in connection with the present application and allow each of the pending claims in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No.08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By: _____

John E. Curtin, Reg. No. 37,602
P.O. Box 8910
Reston, Virginia 20195
(703) 668-8000

JEC:psy

Enclosures: Three (3) copies of Appellant's Brief
Appendix A -- Clean version of pending claims
Appendix B -- Amendment filed July 26, 2004
Appendix C -- Figure 1

APPENDIX A

1. (Previously Presented) The device as in claim 13 wherein the prioritization unit is further adapted to prioritize transmission request signals from the terminal units based on achievable data rates.

2. (Previously Presented) The device as in claim 1 wherein the prioritization unit is further adapted to assign a highest priority to a transmission request signal associated with a highest achievable data rate.

3. (Previously Presented) The device as in claim 2 wherein the authorization unit is further adapted to authorize a terminal unit associated with the highest achievable data rate to send a transmission.

4. (Previously Presented) The device as in claim 1 wherein the authorization unit is further adapted to authorize a terminal unit associated with a prioritized transmission request signal to send a transmission.

5. (Cancelled)

6. (Cancelled)

7. (Previously Presented) The device as in claim 1, wherein the prioritization unit is further adapted to periodically poll a data rate associated with a terminal unit within the network.

8. (Previously Presented) The device as in claim 7 wherein the prioritization unit is further adapted to adjust a priority associated with the terminal unit based on the polled data rate.

9. – 12. (Cancelled)

13. (Previously Presented) A device for scheduling transmissions in an interference-limited network comprising:

a prioritization unit adapted to send a transmission test signal to terminal units, and prioritize each transmission test signal based on achievable data rates, each terminal associated with an achievable data rate; and

an authorization unit adapted to authorize transmissions to the terminal units based on the priority of the test signals.

14. (Previously Presented) The device as in claim 13, wherein the prioritization unit is further adapted to assign a highest priority to a transmission test signal associated with a highest achievable data rate.

15. (Previously Presented) The device as in claim 14 wherein the authorization unit is further adapted to authorize a transmission to a terminal unit associated with the highest achievable data rate.

16. (Cancelled)

17. (Original) The device as in claim 13 wherein the device comprises a bandwidth allocation unit.

18. (Previously Presented) The device as in claim 13 wherein the device further comprises a multiplexer.

19. (Previously Presented) The method as in claim 29 further comprising:

prioritizing transmission request signals from the terminal units based on achievable data rates.

20. (Original) The method as in claim 19 further comprising assigning a highest priority to a transmission request signal associated with a highest achievable data rate.

21. (Previously Presented) The method as in claim 20 further comprising authorizing a terminal unit associated with the highest achievable data rate to send a transmission.

22. (Previously Presented) The method as in claim 19 further comprising authorizing a terminal unit associated with a prioritized transmission request signal to send a transmission.

23. (Previously Presented) The method as in claim 19 further comprising periodically polling a data rate associated with a terminal unit within the network.

24. (Original) The method as in claim 23 further comprising adjusting a priority associated with the terminal unit based on the polled data rate.

25. – 28. (Cancelled)

29. (Previously Presented) A method for scheduling transmissions in an interference-limited network comprising:

sending a transmission test signal to terminal units;

prioritizing each transmission test signal based on achievable data rates, each terminal unit associated with an achievable data rate; and

authorizing transmissions to terminal units based on the priority of the transmission test signals.

30. (Original) The method as in claim 29 further comprising assigning a highest priority to a transmission test signal associated with a highest achievable data rate.

31. (Previously Presented) The method as in claim 30 further comprising authorizing a transmission to a terminal unit associated with the highest achievable data rate.

32. (Cancelled)

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:	09/632,215
Filing Date:	August 3, 2000
Applicant:	Krishna BALACHANDRAN et al.
Group Art Unit:	2661
Examiner:	Robert W. Wilson
Title:	METHODS AND DEVICES FOR SCHEDULING TRANSMISSIONS IN INTERFERENCE-LIMITED NETWORKS
Attorney Docket:	29250-000952/US

BOX AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

July 26, 2004

AMENDMENT AFTER FINAL

Sir:

Applicants are in receipt of the Final Office Action dated April 26, 2004 ("Final Office Action") and respond as follows.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 8 of this paper.

IN THE CLAIMS

Kindly amend claims 1-4, 7, 8, 13-16, 18, 19, 21-23, 29, 31 and 32 and cancel claims 5, 6, 9-12, 16, 25-28 and 32 without prejudice to, or disclaimer of, the subject matter disclosed therein. The subject matter of these cancelled claims is contained in one or more of the claims which remain. Accordingly, the cancellation of these claims is not related to the patentability of the invention, but rather to reduce the apparent redundancy of the claims.

The following is a complete listing of revised claims with a status identifier in parenthesis.

LISTING OF CLAIMS

1. (Currently Amended) [[A]] The device as in claim 13 ~~for scheduling transmissions in an interference limited network,~~ wherein the ~~device~~ prioritization unit is further adapted to[[:]]

~~send transmission test signals to one or more terminal units; and~~

prioritize transmission request signals from ~~the one or more~~ the terminal units based on achievable data rates~~, each rate associated with one of the test signals~~.

2. (Currently Amended) The device as in claim 1 wherein the ~~device~~ prioritization unit is further adapted to assign a highest priority to a transmission request signal associated with a highest achievable data rate.

3. (Currently Amended) The device as in claim 2 wherein the ~~device~~ authorization unit is further adapted to authorize a terminal unit~~, of the one or more terminal units,~~ associated with the highest achievable data rate to send a transmission.

4. (Currently Amended) The device as in claim 1 wherein the ~~device~~ authorization unit is further adapted to authorize a terminal unit~~, of the one or more terminal units,~~ associated with a prioritized transmission request signal to send a transmission.

5. (Cancelled)

6. (Cancelled)

7. (Currently Amended) The device as in claim 1, wherein the ~~device~~ prioritization unit is further adapted to periodically poll a data rate associated with a terminal unit~~, of the one or more terminal units,~~ within the network.

8. (Currently Amended) The device as in claim 7 wherein the ~~device~~ prioritization unit is further adapted to adjust a priority associated with the terminal unit based on the polled data rate.

9. – 12. (Cancelled)

13. (Currently Amended) A device for scheduling transmissions in an interference-limited network~~, wherein the device is adapted to~~ comprising:

a prioritization unit adapted to send a transmission test ~~signals~~ signal to ~~one or more~~ terminal units[[;]], and prioritize [[the]] each transmission test ~~signals~~ signal based on achievable data rates, each ~~rate associated with one of the test signals~~ terminal associated with an achievable data rate; and

an authorization unit adapted to authorize transmissions to the terminal units based on the priority of the test signals.

14. (Currently Amended) The device as in claim 13, wherein the ~~device~~ prioritization unit is further adapted to assign a highest priority to a transmission test signal associated with a highest achievable data rate.

15. (Currently Amended) The device as in claim 14 wherein the ~~device is further~~ authorization unit is further adapted to authorize a transmission to a terminal unit~~, of the one or more terminal units,~~ associated with the highest achievable data rate.

16. (Cancelled)

17. (Original) The device as in claim 13 wherein the device comprises a bandwidth allocation unit.

18. (Currently Amended) The device as in claim 13 wherein the device further comprises a multiplexer.

19. (Currently Amended) [[A]] The method ~~for scheduling transmissions in an interference-limited network~~ as in claim 29 further comprising:

~~sending transmission test signals to one or more terminal units; and~~

prioritizing transmission request signals from ~~the one or more~~ the terminal units based on achievable data rates~~, each rate associated with one of the test signals~~.

20. (Original) The method as in claim 19 further comprising assigning a highest priority to a transmission request signal associated with a highest achievable data rate.

21. (Currently Amended) The method as in claim 20 further comprising authorizing a terminal unit~~, of the one or more terminal units,~~ associated with the highest achievable data rate to send a transmission.

22. (Currently Amended) The method as in claim 19 further comprising authorizing a terminal unit~~, of the one or more terminal units,~~ associated with a prioritized transmission request signal to send a transmission.

23. (Currently Amended) The method as in claim 19 further comprising periodically polling a data rate associated with a terminal unit~~, of the one or more terminal units,~~ within the network.

24. (Original) The method as in claim 23 further comprising adjusting a priority associated with the terminal unit based on the polled data rate.

25. – 28. (Cancelled)

29. (Currently Amended) A method for scheduling transmissions in an interference-limited network comprising:

sending a transmission test ~~signals~~ signal to ~~one or more~~ terminal units;

[[and]]

prioritizing [[the]] each transmission test ~~signals~~ signal based on achievable data rates, each ~~rate associated with one of the test signals~~ terminal unit associated with an achievable data rate; and

authorizing transmissions to terminal units based on the priority of the transmission test signals.

30. (Original) The method as in claim 29 further comprising assigning a highest priority to a transmission test signal associated with a highest achievable data rate.

31. (Currently Amended) The method as in claim 30 further comprising authorizing a transmission to a terminal unit~~, of the one or more terminal units,~~ associated with the highest achievable data rate.

32. (Cancelled)

REMARKS

Section 112, First Paragraph Rejections

Claims 1-18 were rejected under 35 U.S.C. §112, first paragraph, the Final Office Action stating that the original independent claims were in a single means claim format. As indicated in Applicants' first response, Applicants respectfully disagree.

Nonetheless, Applicants have amended these claims to include the terms "prioritization unit" and/or "authorization unit."

Accordingly, Applicants respectfully request withdrawal of the pending rejections and allowance of claims 1-18.

Claim Objections

Claims 1-32 were objected, the Final Office Action stating that the words "each rate associated with one of the test signals" was not clearly understandable.

Applicants have amended these claims to more particularly point out that a transmission test signal is sent to one or more terminal units and that each of the terminal units is associated with at least one achievable data rate. Accordingly, Applicants respectfully request withdrawal of the pending objections and allowance of claims 1-32.

Section 103 Rejections

Claims 1-6, 9, 19-22 and 27 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sumner, U.S. Patent No. 6,091,947 ("Sumner").

Applicants respectfully disagree and traverse this rejection for at least the following reasons.

Each of the remaining claims requires authorization of transmissions to terminal units based on the priority given to test signals sent to each of the terminal units ("test signals").

In contrast, Sumner does not disclose or suggest the authorization of transmissions to terminal units based on the priority given to test signals, as in the claims of the present invention.

Column 7 of Sumner appears to disclose the reception of a test signal by a handset and the calculation of outbound and inbound link performances. However, Sumner does not disclose or suggest the authorization of transmissions to particular handsets based on prioritizing test signals. Instead, transmission to handsets are unprioritized (i.e., occur in any order). That is, as long as the calculated link performances allow for transmission, transmission occurs regardless of priority. If the link performance is unsatisfactory, no transmission occurs and a call is routed to a user's voicemail.

Accordingly, Applicants respectfully request withdrawal of the pending rejections and allowance of claims 1-6, 9, 19-22 and 27.

Applicants respectfully request consideration and entry of the present amendments and arguments. Applicants believe their amendments places the

claims and the application in better condition for allowance and/or appeal and does not require further search on the part of the Examiner.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John E. Curtin at the telephone number of the undersigned below.

In the event this Response does not place the present application in condition for allowance, applicant requests the Examiner to contact the undersigned at (703) 668-8000 to schedule a personal interview.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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By _____

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FIG. 1